

Claims

I claim:

1. A method of color calibration for calibrating an input color into a target color, the target color being represented by a first coordinate pair (X1, Y1) in a color coordinate system, the method of color calibration comprising the steps of:
 - (1) inputting the input color, the input color being represented by a second coordinate pair (X2, Y2) in the color coordinate system and being adjusted by a saturation parameter Pb and a chrominance parameter Pr;
 - (2) respectively comparing X1 with X2 and comparing Y1 with Y2 to obtain a state; and
 - (3) respectively adjusting the saturation parameter Pb and the chrominance parameter Pr in response to the state until $X1 = X2$ and $Y1 = Y2$.
2. The method of color calibration of claim 1, wherein the step (2) further comprises:
 - (2.1) subtracting X1 from X2 to derive a first value;
 - (2.2) subtracting Y1 from Y2 to derive a second value; and
 - (2.3) evaluating the first value and the second value.
3. The method of color calibration of claim 2, wherein when the first value and the second value have a same sign in the step (2.3), the step (3) further comprises:
 - (3.1) adjusting the saturation parameter Pb until one of the following conditions is satisfied:

the first value and the second value have different signs; and

one of the first value and the second value is zero.

4. The method of color calibration of claim 3, wherein when the first value and the second value are larger than zero in step (2.3), the step (3.1) further comprises:
 - (4.1) decreasing the saturation parameter P_b to satisfy one of a first condition and a second condition;wherein the first condition comprises that the first value is not larger than zero, and the second condition comprises that the second value is not larger than zero.
5. The method of color calibration of claim 4, wherein the step (4.1) further comprises:
 - (5.1) assigning a half of a difference between Y_1 and Y_2 as a D_y value when the first condition is satisfied; and
 - (5.2) decreasing the saturation parameter P_b until the difference between Y_1 and Y_2 is not larger than the D_y value.
6. The method of color calibration of claim 4, wherein the step (4.1) further comprises:
 - (6.1) assigning a half of a difference between X_1 and X_2 as a D_x value when the second condition is satisfied; and
 - (6.2) decreasing the saturation parameter P_b until the difference between X_1 and X_2 is not larger than the D_x value.
7. The method of color calibration of claim 3, wherein when the first value and the second value are less than zero in the step (2.3), the step (3.1) further comprises:
 - (7.1) increasing the saturation parameter P_b to satisfy one of a third condition and a fourth condition;wherein the third condition comprises that the first value is not less than zero, and the fourth condition comprises that the second value is not less than zero.

8. The method of color calibration of claim 7, wherein the step (7.1) further comprises:
 - (8.1) assigning a half of a difference between Y1 and Y2 as a Dy value when the third condition is satisfied; and
 - (8.2) increasing the saturation parameter Pb until the difference between Y1 and Y2 is not less than the Dy value.
9. The method of color calibration of claim 7, wherein the step (7.1) further comprises:
 - (9.1) assigning a half of a difference between X1 and X2 as a Dx value when the fourth condition is satisfied; and
 - (9.2) increasing the saturation parameter Pb until the difference between X1 and X2 is not less than the Dx value.
10. The method of color calibration of claim 2, wherein when the first value and the second value have different signs in the step (2.3), the step (3) further comprises:
 - (3.2) adjusting the chrominance parameter Pr until one of the following conditions is satisfied:
 - the first value and the second value have a same sign; and
 - one of the first value and the second value is zero.
11. The method of color calibration of claim 10, wherein when the first value is larger than zero and the second value is less than zero in the step (2.3), the step (3.2) further comprises:
 - (11.1) increasing the chrominance parameter Pr to satisfy one of a fifth condition and a sixth condition;

wherein the fifth condition comprises that the first value is not larger than zero, and
the sixth condition comprises that the second value is not less than zero.

12. The method of color calibration of claim 11, wherein the step (11.1) further comprises:

(12.1) assigning a half of a difference between Y1 and Y2 as a Dy value when the fifth condition is satisfied; and

(12.2) increasing the saturation parameter Pb until the difference between Y1 and Y2 is not less than the Dy value.

13. The method of color calibration of claim 11, wherein the step (11.1) further comprises:

(13.1) assigning a half of a difference between X1 and X2 as a Dx value when the sixth condition is satisfied; and

(13.2) decreasing the saturation parameter Pb until the difference between X1 and X2 is not larger than the Dx value.

14. The method of color calibration of claim 10, wherein when the first value is less than zero and the second value is larger than zero in the step (2.3), the step (3.2) further comprises:

(14.1) decreasing the chrominance parameter Pr to satisfy one of a seventh condition and an eighth condition;

wherein the seventh condition comprises that the first value is not less than zero, and
the eighth condition comprises that the second value is not larger than zero.

15. The method of color calibration of claim 14, wherein the step (14.1) further comprises:
 - (15.1) assigning a half of a difference between Y1 and Y2 as a Dy value when the seventh condition is satisfied; and
 - (15.2) decreasing the saturation parameter Pb until the difference between Y1 and Y2 is not less than the Dy value.
16. The method of color calibration of claim 14, wherein the step (14.1) further comprises:
 - (16.1) assigning a half of a difference between X1 and X2 as a Dx value when the eighth condition is satisfied; and
 - (16.2) increasing the saturation parameter Pb until the difference between X1 and X2 is not larger than the Dx value.
17. The method of color calibration of claim 1, wherein the step (3) further comprises:
 - (3.3) adjusting the chrominance parameter Pr until $X1 = X2$ and $Y1 = Y2$.
18. The method of color calibration of claim 1, wherein, when the saturation parameter Pb is increased, an increment of X2 is equal to an increment of Y2, and when the saturation parameter Pb is decreased, a decrement of X2 is equal to a decrement of Y2.
19. The method of color calibration of claim 1, wherein, when the chrominance parameter Pr is increased, a decrement of X2 is equal to an increment of Y2, and

when the chrominance parameter Pr is decreased, an increment of $X2$ is equal to a decrement of $Y2$.

20. An apparatus for color calibration for calibrating an input color into a target color, the target color being represented by a first coordinate pair $(X1, Y1)$ in a color coordinate system, the apparatus of color calibration comprising:

an input device for inputting the input color, the input color being represented by a

second coordinate pair $(X2, Y2)$ in the color coordinate system and being

adjusted by a saturation parameter Pb and a chrominance parameter Pr ;

a comparison device for respectively comparing $X1$ with $X2$ and $Y1$ with $Y2$ to

obtain a state; and

an adjustment device for respectively adjusting the saturation parameter Pb and the

chrominance parameter Pr in response to the state until $X1 = X2$ and $Y1 =$

$Y2$.

21. The apparatus for color calibration of claim 20, wherein the comparison device obtains the state by subtracting $X1$ from $X2$ to derive a first value, subtracting $Y1$ from $Y2$ to derive a second value, and evaluating the first value and the second value.

22. The apparatus for color calibration of claim 21, wherein when the comparison device evaluates that the first value and the second value have a same sign, the adjustment device adjusts the saturation parameter Pb until one of the following conditions is satisfied:

the first value and the second value have different signs; and

one of the first value and the second value is zero.

23. The apparatus for color calibration of claim 22, wherein, when the comparison device evaluates that the first value and the second value are larger than zero, the adjustment device decreases the saturation parameter P_b to satisfy one of a first condition and a second condition, the first condition comprises that the first value is not greater than zero, and the second condition comprises that the second value is not greater than zero.
24. The apparatus for color calibration of claim 23, wherein when the first condition is satisfied, the adjustment device further assigns a half of a difference between Y_1 and Y_2 as a D_y value and decreases the saturation parameter P_b until the difference between Y_1 and Y_2 is not greater than the D_y value.
25. The apparatus for color calibration of claim 23, wherein when the second condition is satisfied, the adjustment device further assigns a half of a difference between X_1 and X_2 as a D_x value and decreases the saturation parameter P_b until the difference between X_1 and X_2 is not greater than the D_x value.
26. The apparatus for color calibration of claim 22, wherein, when the comparison device evaluates that the first value and the second value are less than zero, the adjustment device increases the saturation parameter P_b to satisfy one of a third condition and a fourth condition, the third condition comprises that the first value is not less than zero, and the fourth condition comprises that the second value is not less than zero.

27. The apparatus for color calibration of claim 26, wherein when the third condition is satisfied, the adjustment device further assigns a half of a difference between $Y1$ and $Y2$ as a Dy value and increases the saturation parameter Pb until the difference between $Y1$ and $Y2$ is not less than the Dy value.
28. The apparatus for color calibration of claim 26, wherein when the fourth condition is satisfied, the adjustment device further assigns a half of a difference between $X1$ and $X2$ as a Dx value and increases the saturation parameter Pb until the difference between $X1$ and $X2$ is not less than the Dx value.
29. The apparatus for color calibration of claim 21, wherein when the comparison device evaluates that the first value and the second value have different signs, the adjustment device adjusts the chrominance parameter Pr until one of the following conditions is satisfied:
 - the first value and the second value have a same sign; and
 - one of the first value and the second value is zero.
30. The apparatus for color calibration of claim 29, wherein, when the comparison device evaluates that the first value is greater than zero and the second value is less than zero, the adjustment device increases the chrominance parameter Pr to satisfy one of a fifth condition and a sixth condition, the fifth condition comprises that the first value is not greater than zero, and the sixth condition comprises that the second value is not less than zero.

31. The apparatus for color calibration of claim 30, wherein when the fifth condition is satisfied, the adjustment device further assigns a half of a difference between Y1 and Y2 as a Dy value and increases the saturation parameter Pb until the difference between Y1 and Y2 is not less than the Dy value.
32. The apparatus for color calibration of claim 30, wherein when the sixth condition is satisfied, the adjustment device further assigns a half of a difference between X1 and X2 as a Dx value and decreases the saturation parameter Pb until the difference between X1 and X2 is not greater than the Dx value.
33. The apparatus for color calibration of claim 29, wherein, when the comparison device evaluates that the first value is less than zero and the second value is greater than zero, the adjustment device decreases the chrominance parameter Pr to satisfy one of a seventh condition and an eighth condition, the seventh condition comprises that the first value is not less than zero, and the eighth condition comprises that the second value is not greater than zero.
34. The apparatus for color calibration of claim 33, wherein when the seventh condition is satisfied, the adjustment device further assigns a half of a difference between Y1 and Y2 as a Dy value and decreases the saturation parameter Pb until the difference between Y1 and Y2 is not less than the Dy value.
35. The apparatus for color calibration of claim 33, wherein the eighth condition is satisfied, the adjustment device further assigns a half of a difference between X1 and

X2 as a Dx value and increases the saturation parameter Pb until the difference between X1 and X2 is not greater than the Dx value.

36. The apparatus for color calibration of claim 20, wherein the adjustment device further adjusts the chrominance parameter Pr until $X1 = X2$ and $Y1 = Y2$.